Soil Conservation

October 1979

U.S. Department of Agriculture

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From the Administrator

Targeting Our Assistance

Constraints of time, money, and energy make it imperative that the Soil Conservation Service and conservation districts *target* their assistance to the places and people with the greatest need.

An important result can be *better* programs, more closely coordinated with other programs and agencies.

In the past year, SCS has had a chance to blend a number of strategies to achieve a "total approach" for an area or project:

- In Western Tennessee, the joint State-Federal plan to combine critical soil erosion in 21 counties where soil losses are four times the national average (or more!);
- In the Rural Abandoned Mine Program, the first-priority work to protect public health, safety, welfare, and property from extreme danger caused by past coal mining. SCS in Pennsylvania is encouraging other State and Federal agencies to look at reclamation on an entire watershed rather than scattering individual assistance;
- In the Great Lakes Basin, United States and Canadian agencies and organizations focusing their assistance on parts of watersheds (hydrologically active areas) where land-use practices or resource conditions are degrading water quality in the basin most. Soil erosion rates are not necessarily the key factor;
- In the small watershed program, local sponsors and SCS striving to get more land treatment installed or scheduled on critically eroding areas before starting to build structures.

There is growing demand for clear targets and criteria with which we can evaluate and predict the performance of many conservation programs. The Soil and Water Resources Conservation Act is providing those checkpoints. Some also may come from other sectors of the government or society, yet we can make a strong contribution.

One important national goal or priority is energy conservation. SCS and district programs can aid significantly as part of areawide efforts to reduce energy use through improved farming and ranching methods, water conservation, and erosion and sediment control.

The need was never greater for innovative ideas in targeting our assistance still further to advance proper use and care of natural resources with the least possible input of financial and human resources.

Our aim must be to improve our conservation aim.

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Conservation practices like these terraces installed through the Maple Creek Model Implementation Project on the Robert Travnicek farm near Clarkson, Nebr., saved an estimated 20,000 tons of soil in 1978. (See article beginning on page 8.)

Back cover:
In Mississippi, Humphreys County is leading the State in catfish production. Fish farming is proving to be a valuable alternative to growing crops. (See article beginning on page 16.)

Drying Up Barnyards

Clean Water Models

In September 1977, the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) joined in an agreement to concentrate on solving nonpoint source pollution in selected areas of the country.

In January 1978, USDA and EPA chose seven areas affected by nonpoint source pollution as Model Implementation Projects (MIP's). They are in Indiana, Nebraska, New York, Oklahoma, South Carolina, South Dakota, and Washington.

The MIP's are a 3-year test to demonstrate how a concentrated effort of cost sharing and technical assistance by USDA and EPA can help solve agriculture-related water quality problems.

The Soil Conservation Service and the Agricultural Stabilization and Conservation Service (ASCS) of USDA and EPA have the lead role in the MIP's. SCS assigned additional personnel to each MIP area. ASCS obligated $1.27 million of Agriculture Conservation Program funds. And EPA made about $1.5 million available for monitoring and evaluation during 1978.

Support from USDA's Science and Education Administration, Farmers Home Administration, Forest Service, and Economics, Statistics, and Cooperatives Service has been excellent. Local and State agencies' support in the MIP's has been outstanding.

The MIP areas range from 24,000 to 287,000 acres. The projects are scheduled to run for 3 years. The MIP areas will receive an average of $200,000 in cost-share assistance per year for 3 years. Cost-share rates vary from 50 to 90 percent.

This is the first part of a three-part series on each of the seven MIP's. The New York, Nebraska, and Oklahoma MIP's are described here. Articles on the Indiana, South Carolina, South Dakota, and Washington MIP's will appear in subsequent issues of *Soil Conservation*.

by Pat Paul

Barnyards in Delaware County, N.Y., are drying up—a fact which pleases farmers, helps the cows, cleans up the water, and meets with the approval of local residents. The dry barnyards are the result of a joint U.S. Department of Agriculture and U.S. Environmental Protection Agency program to complete seven Model Implementation Projects (MIP's) for improving water quality.

Soil Conservation Service State Conservationist Robert Hilliard in Syracuse said, "The MIP here is a big success. The project had specific goals and the farmers had specific problems. Through the MIP we met both needs."

"There was some confusion and concern when farmers first learned of the project," said Milt Thomson, chairperson of the Delaware County Soil and Water Conservation District (SWCD). "Some people were concerned that efforts to improve water quality would lead to increased land use controls. But after checking out the objective of the MIP, Bob Miller, president of the Delaware County Farm Bureau, urged farmers to participate in the program.

"The Delaware County SWCD and the local Agricultural Stabilization and Conservation Service (ASCS) committee decided to sponsor the project for several reasons," said Thomson. "Many people blamed farming for the increasing algae growth in the Cannonsville Reservoir, a major New York City water supply. Also, one of the goals of the MIP was to learn more about existing water quality problems in the watershed. Besides helping farmers voluntarily apply effective measures to control agricultural nonpoint source pollution, the project could also help eliminate the need for regulations to control this type of pollution.

"But the main reason for sponsoring the MIP was to help improve the economic base for farm operations in Delaware County by providing cost-share incentives," said Thomson.

In 1978, the watershed of the West Branch of the Delaware River was approved as one of the seven MIP's nationwide. Located in the southeastern part of the State, the watershed covers 287,000 acres and takes in 275 dairy farms. Dairy farming is the single largest industry in the area. There is also a meat packing plant, a milk processing plant, and a hubcap manufacturing plant. The population of the area is 17,000.

Because of the size of the watershed, the MIP advisory group had to select high priority areas needing critical water quality treatment. The advisory group used a study prepared by SCS on nonpoint source water pollution in the West

Branch along with other information in setting priorities for the MIP work.

Water monitoring samples taken in 1977 by the New York City Board of Water Supply showed high levels of phosphorus in four tributaries at the upper end of the watershed. According to a study by USDA's Economics, Statistics, and Cooperatives Service at Cornell University, three-quarters of the barnyards in the area are located within 200 feet of a stream. The advisory group decided to begin MIP efforts on the four tributaries.

ASCS provided $325,000 in special project funds to assist in the installation of practices designed to reduce pollution from probably the three biggest contributors to phosphorus loadings—barnyard runoff, manure spreading and storage, and milkhouse waste disposal. The MIP advisory group agreed to provide 90-percent cost sharing for certain practices with a limit of $2,500 per farmer for the first year. This was increased to $3,500 the second year.

In March 1978, USDA's Science and Education Administration–Extension invited all the farmers from the West Branch area to the first MIP public meeting at the Bloomville firehall. "More than half of the invited farmers came to the first meeting," said SCS District Conservationist Richard Lewis. ASCS representatives explained how the cost-share program would work. SCS explained how a conservation plan would be developed for each farm to provide for low-cost, efficient pollution control practices as part of good farm management. Needed practices would be installed under 3-year contracts. The planning emphasized animal waste management but also included erosion and sediment control.

Six different studies of the Cannonsville Reservoir had identified phosphorus as the main water quality problem. "Barnyards were the number one priority," said Lewis. A Cornell University study of the Fall Creek watershed near Ithaca, N.Y., had indicated that in the case of dissolved

To keep cows out of a stream that cuts his farm in half, Allan Weinmann installed a 36-inch culvert with cost-sharing assistance available through the MIP program.

SCS District Conservationist Richard Lewis inspects a tile line that diverts roof water away from a barnyard.

phosphorus, the most cost effective way to reduce phosphorus from agricultural sources was by controlling barnyard runoff.

"While many farmers might recognize water quality problems associated with barnyard runoff, the challenge is to convince them of the need to install effective but sometimes costly control measures," noted Lewis. "I honestly don't think we could have persuaded some of them based on the need to improve water quality alone. We had to show them the benefits to their farm operation.

"For example, some farmers felt that by improving barnyard conditions, they would be able to improve herd health, reduce hoof disease, and reduce sediment in the milk. Some badly mired barnyards were not only a nuisance to farmers, but also took time and labor away from other farm operations for periodic cleanups.

"By talking about the total concept of barnyard management, we attracted farmers who had never before participated in the soil and water conservation program. It must have been the right approach because, during the first 3 months, 92 farmers—about a third of those in the watershed—signed up for the program."

A drop inlet on a West Branch area farm catches surface water before it runs across the barnyard. Richard Lewis, SCS district conservationist, examines the steel grate over the inlet.

"The MIP provided a whole new direction," said ASCS Director George Komer. "Cost sharing had long been used for manure storage structures and other similar measures, but the MIP called for innovative practices to control barnyard runoff and milkhouse waste that were not covered by the Agricultural Conservation Program. For the first time, funds were used to cost share temporary manure storage, filter strips, and gutters and downspouts on barns. Now, the practices are part of the statewide program."

"We could have attacked the problem of controlling barnyard runoff in two ways," said Lewis. "One way was to collect the polluted runoff water as it left the barnyard and either put it in a holding pond for later disposal or direct it to a safe disposal area. But this method had no benefit for the farmer.

"The method we decided to use was keeping clean runoff water out of the barnyard area, thus drying up the barnyards. Keeping barnyards dry was a significant selling point in seeking voluntary participation by farmers. Solving the water quality problem was also part of meeting the farmers' needs."

The Burns brothers' farm in the West Branch area is a good example of the MIP's success in controlling barnyard runoff. The Burns' barnyard is within 100 feet of a protected trout stream and runoff from the hillside above the barn traveled across the barnyard and into the stream. There were also problems with the concrete pushoff dock in front of the barn. The Burns have a free-stall operation which means the stall area is cleaned by scraping the manure off the concrete dock and into a manure spreader. Manure that missed the spreader accumulated at the base of the dock. During peak runoff times, the accumulated manure was carried into the stream.

To solve the problem, SCS provided technical assistance in building a diversion ditch around the barnyard to catch clean surface water and water that runs off the roof and carry it to the stream. A culvert was put into the diversion ditch for a livestock crossing and a 1-foot high concrete lip was added to the existing concrete pad to keep manure from running off the pad.

Allan Weinmann, another West Branch area farmer, re-

ceived MIP cost sharing and technical assistance for installing a culvert in the stream on his farm to keep the cows from wading through the stream when they headed for the pasture. After the culvert was in, Weinmann had his cows' milk tested at the creamery. The creamery determined there was less sediment in the milk.

Seeps from springs on the Don Ackerly farm had made his barnyard wet and muddy much of the year. Through the MIP the barnyard was graded, shaped, and graveled. A stone inlet and tile line were installed to catch surface water and water from the springs and divert it from the barnyard. Ackerly said that the drier barnyard has helped reduce hoof disease in his herd.

Besides wet barnyards, another problem throughout the watershed is the disposal of milkhouse waste. Soils in the area are dense and compact permitting little infiltration of water, thus they are unsuited for septic systems and filter fields for milkhouse waste. On many farms, milkhouse waste is run through a pipe and outletted in the barnyard or directly into a stream. Milkhouse waste treatment lagoons are one solution. But for less critical milkhouse waste problems, Sanitary Engineer Jim Krider from the SCS Northeast Technical Service Center recommended the use of filter strips. SCS has developed new standards and specifications for using filter strips for milkhouse waste. In most cases, the cost for filter strips is less than for milkhouse waste treatment lagoons.

Manure spreading and storage also contribute to water pollution in the West Branch area. About 43 percent of the cropland in the watershed is on slopes of more than 8 percent. Winter spreading of manure is necessary for many farmers, but it is difficult to spread the manure properly because of weather conditions. Various alternatives to winter spreading were considered. Expensive long-term storage of manure may be needed, depending on herd size and farm management needs. In most cases, though, temporary stockpiling of manure during the worst weather is sufficient. A new SCS standard and specification for waste field storage was developed for stockpiling manure for 60 days or less. It involves regrading an area of a field to allow for stockpiling. Surface water is diverted around the site to keep runoff from entering the storage area. More than one site may be needed on some farms.

Conservation practices to control runoff have traditionally been used to reduce erosion. Many of these same practices can benefit water quality by reducing runoff which carries sediment, nutrients, and chemicals into streams and lakes.

"Because we don't know yet if it is dissolved phosphorus or phosphorus attached to soil particles which is causing the eutrophication problem in the Cannonsville Reservoir, we are trying to address both problems in the MIP," said Lewis. "Some water quality experts say dissolved phosphorus from animal waste is more significant than phosphorus attached to soil particles in terms of water quality."

To estimate how much of the MIP cost-sharing money is actually being spent for practices to improve water quality, SCS State Resource Conservationist in New York, Lloyd Wright, developed a water quality budget process. Percentages were assigned to the conservation practices installed to improve water quality in various circumstances. For example, 25 percent of the cost of a diversion ditch on a cropland field is designated as benefiting water quality, whereas 100 percent of the cost for a diversion ditch above a barnyard is allocated to water quality improvement. This evaluation tool will help quantify the overall cost and effects for conservation practices to improve water quality in the West Branch area watershed.

The MIP convinced people that a voluntary approach to improving water quality, using existing conservation programs and supported by strong interagency cooperation, would be well accepted by the farm community. The key to success in controlling barnyard runoff in the project has been finding and using measures which have direct benefit to the farmer as well as offsite water quality improvement benefits.

"Everyone thinks we just apply practices," Lewis said. "The important questions we have to answer are what practices are needed, how do we get farmers to participate, and how do we have a positive effect on both agriculture and water quality? We are here because this is basically an agricultural area. We have to help the farmer stay in business while protecting soil and water resources."

Ms. Paul is public information officer, SCS, Syracuse, N.Y.

Cleaning Up the Creek

by James C. Gonsior

"I used to lay out my own contouring, but it didn't always come out the way I wanted. The fields either ended up washing out or silting in," said Robert Travnicek, a farmer in the Maple Creek watershed near Clarkson, Nebr.

"Now it'll actually be easier to farm than before. I believe in terraces and the Model Implementation Project (MIP) was a good opportunity to install terraces on some of my land," he said.

Through the MIP, terraces and other conservation practices have become a reality for many farmers in the 150,000-acre Maple Creek watershed in east-central Nebraska. The watershed includes parts of Stanton, Colfax, and Platte Counties. Being selected as an MIP meant $275,000 in cost-sharing funds available each year of the project in addition to the regular Agricultural Conservation Program (ACP) allotment.

"This area, historically, has had little conservation applied to the land," said Gene Phillips, Soil Conservation Service district conservationist in Stanton County. "We estimate that 15 to 20 tons of soil per year are eroded from every acre in the watershed.

"There is an abundance of deep silty clay loam soils in the watershed, so the erosion usually did not decrease crop yields. People simply did not have an economic incentive to apply conservation."

Most of the Maple Creek MIP area is Class III and IV land. The topography is characterized by steep hills with irregular short slope lengths of 100 to 500 feet.

According to a U.S. Department of Agriculture survey of 172 land units in the Maple Creek watershed, only 2 percent of the tenants and none of the landowners would admit to erosion problems, while an SCS survey determined that 82 percent of the farms in the area had major soil erosion problems.

"But the MIP has helped change some of the attitudes toward conservation in the area," said Ed Harms, SCS district conservationist in Platte County. "Previously, conservation was socially unacceptable and many farmers who applied

In Nebraska, Dennis Kabes installed 15,000 feet of pushup terraces on his farm to improve water quality in the Maple Creek watershed. He received cost-share assistance in installing the terraces through the Maple Creek Model Implementation Project.

land treatment were ridiculed by their neighbors.

"The cost-sharing money has been the key selling point. Funds from the ACP and the Lower Elkhorn Natural Resources District (NRD) are providing 90 percent and higher cost sharing."

The Lower Elkhorn NRD has created a "Lands for Conservation Program" for farmers in the MIP area. The program provides $40 per acre to farmers for up to 60 acres if they install conservation practices in June, July, or August.

"In the Maple Creek MIP, farmers usually put off any land improvement work until after fall harvest," said Harms. "Under the NRD's program, a farmer can harvest oats in July, have the conservation work installed in August, and collect the added money."

"The district also provides 90 percent cost sharing for projects that exceed the ACP cost-sharing limitation," said Phillips. "So far that has amounted to about $325,000 for cost-share practices above the $275,000 available through ACP."

"I've always wanted to do some conservation on my fields," said Dean Teply of Clarkson about his new dam and 5,000 feet of parallel pushup terraces. "I want to keep my soil and water here. I don't want to see it going to Louisiana.

"The cost-share program of the MIP was my main incentive. I couldn't have afforded to do all this myself."

Dennis Kabes, a local farmer, who applied 15,000 feet of terraces in 1978 is planning on doing more. "The cost-share money is now available to apply conservation and I don't want my soil washed into the creek," Kabes said.

In 1978 the MIP program had a good year even though the project didn't get underway until April when most farmers had their crops planned. There were more than 13 miles of terraces, 1,200 acres of conservation tillage, 15 acres of grassed waterways, 8 ponds, and 20 acres of pasture planting installed.

"There was more visible conservation installed in the MIP area last year than there had been in the previous 7 years," said Phillips.

"According to our calculations, more than 20,000 tons of soil was saved in 1978," said Phillips. "The soil was held on the hills and kept out of the creeks and streams.

"The three county Agricultural Stabilization and Conservation Service committees have also chosen to cost share with farmers who practice conservation tillage. Depending on the amount of residue, farmers can receive $6 or $12 per acre on an individual field or on their entire farm," said Phillips.

Estimated treatment needs in the Maple Creek MIP are: 600 miles of terraces; 22,000 acres of conservation tillage; 600 acres of grassed waterways; and 60 erosion and sediment control dams.

"In addition to the land treatment being applied under the MIP, USDA's Science and Education Administration (SEA) has installed water quality monitoring stations at key sites. From the study, researchers will be able to develop design criteria for sediment basins to control losses and pollution of runoff on row-cropped land with steep slopes and irregular topography. They will also be able to provide designs to reduce energy requirements both for farming and construction as an alternative to, or in addition to, terraces.

Landowners are kept informed on the MIP developments by the Cooperative Extension Service through public information efforts. Extension Service people have held public meetings to explain the project and programs available to the farmers. A special quarterly MIP newsletter is also sent to the 172 landowners in the area.

To help make personal contacts, and plan and layout the conservation practices, SCS assigned an additional soil conservationist and conservation technician to the Maple Creek MIP area.

"In the beginning, most people involved in the project were concerned over what would happen when the MIP was fully initiated. Most of us have been pleasantly surprised," said Phillips.

So far in 1979, conservation tillage has been used on an additional 5,700 acres. Nine ponds have been installed and three more are planned. Terraces have been installed on 3 farms, and 23 farmers are waiting to have terraces put in after their crops are harvested.

"We are expecting an even better year in 1980," said Phillips. "We already have 24 terraces and sediment water control systems, 12 small dams, and 2 animal waste facilities among the practices to be installed.

"The Maple Creek MIP proves that conservation will be applied if incentives are provided to the landowners. It also shows that Federal and State agencies can cooperate for the overall improvement of water quality."

Mr. Gonsior is district conservationist, SCS, Schuyler, Nebr.

Keeping Soil from Washing Down the Washita

by F. Dwain Phillips

Easily eroded soils, highly variable rainfall, and the resulting sediment deposited in streams made the Little Washita River watershed in south-central Oklahoma a candidate for the Model Implementation Project (MIP) program. In 1978, it was selected as one of seven MIP's in the Nation.

The MIP program is the result of an agreement between the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) to concentrate efforts on providing technical and financial assistance for improving water quality in selected watersheds. Conservation work will be aimed at solving nonpoint source pollution problems.

The Little Washita watershed includes parts of three counties—Grady, Comanche, and Caddo—and encompasses 154,270 acres. More than 75 percent of the area is used for range and pastureland. About 20 percent is used for cropland, and the rest is in roads and other uses.

To carry out the MIP objectives, the Soil Conservation Service and local conservation districts made a detailed inventory delineating all major use areas in the watershed and isolating potential factors affecting water quality.

The inventory showed about 15,000 acres needing revegetation, more than 3,500 acres needing critical area treatment, and almost 3,000 acres needing terracing. The inventory also showed about 1,400 acres of roadside erosion.

SCS assessed the nonpoint source pollution problem in the watershed and recommended the most effective and practical conservation practices for controlling it. The best management practices (BMP's) that SCS recommended included critical area treatment, revegetation, terracing, conservation tillage, grassed waterways, animal waste management systems, deferred grazing, erosion control structures, and protection of stream corridors.

Gullying and the sedimentation it causes are the two major nonpoint sources of water pollution in the watershed. The sandy loam soils are highly susceptible to erosion when not adequately protected by vegetative cover, and gullies are common on pastureland and rangeland. Critical area treatment for gullies in the MIP includes shaping and sprigging bermudagrass. But in severely eroded areas where shaping is not feasible, black locust trees are planted to reduce erosion. Multiflora rose shrubs are also planted in these areas to provide food and cover for wildlife.

To help landowners install conservation practices, SCS is providing technical assistance through the conservation districts. An additional soil conservationist was assigned to each of the SCS field offices serving the MIP area to provide accelerated assistance to landowners.

SCS provides financial assistance in installing BMP's through the Great Plains Conservation Program (GPCP), the Resources Conservation and Development Program, and the flood prevention and critical area treatment programs under the Flood Control Act of 1944 (Public Law 534). The Little Washita watershed is the only MIP area eligible for GPCP or Public Law 534 funds under SCS-administered cost-share programs as well as for cost sharing provided through the Agricultural Conservation Program administered by the Agricultural Stabilization and Conservation Service (ASCS). Cost-share rates vary from 50 to 90 percent of cost.

To measure how the applied practices affect water quality, the Science and Education Administration (SEA) will use two major monitoring stations. One is at the lower end of the Little Washita River and one is at the midway point. The stations will sample total flow, bedload, suspended solids, and contamination by pesticides and fertilizer.

Loren Heavin, Science and Education Administration engineering technician, works on a water quality monitoring station in the Little Washita River watershed.

At 24 SEA surface water sampling sites, water will be sampled four times a year to monitor changes in chemical composition. SEA has also set up five unit source watersheds through which the amount of sediment washing off treated areas will be compared to the amount washing off untreated areas. For example, the amount of sediment washing off a gullied area that has been shaped and vegetated will be compared to the amount washing off an untreated, gullied area with slope, soil type, and other conditions being similar.

Two detention reservoirs will be monitored to provide information on the effect flood retarding structures have on water quality by sampling the inflow and outflow. Twelve rain gages throughout the watershed measure the amount and intensity of rainfall while the chemical composition, temperature, relative humidity, and pan evaporation of rainfall are monitored at climatic stations.

At each unit source watershed there will also be a rain gage to measure the amount of rainfall and its nutrient composition. Twenty-six ground water wells are being monitored to check the chemical composition of the water and changes in water level in underground water tables.

SCS, ASCS, SEA, and the Farmers' Home Administration, all agencies of USDA, are cooperating in the project along with EPA and the U.S. Department of the Interior. The Oklahoma Conservation Commission, the Oklahoma Department of Pollution Control, county commissioners, and other State and local agencies are also involved in the MIP.

At the end of the 3-year MIP period, USDA and EPA will have valuable information on how effective different conservation practices are in reducing the amount of nonpoint source pollution entering the streams in the Little Washita River watershed. The information will be used in reducing sediment loads in streams and rivers throughout the State and the Nation.

Mr. Phillips is public information officer, SCS, Stillwater, Okla.

Science and Education Administration Agricultural Engineer Edd Rhoades prepares equipment for setting grade stakes in installing a monitoring station that will test the effect a flood control structure has on water quality.

Farm ponds, stripcropping, and other conservation practices help provide food and cover for many kinds of wildlife.

Farmers and Ranchers as Wildlife Managers

Reprinted from *Fish and Wildlife News*, published by the Fish and Wildlife Service, U.S. Department of the Interior, February 1979.

by R. M. Davis

The same people who produce America's food and fiber also have a serious commitment to protecting and enhancing wildlife habitat.

That is good news because the non-Federal land that they own or manage makes up 1.3 billion acres—more than half of the land in the United States. The total is about equally divided among cropland, forest land, and pasture and rangeland. All of it plays a significant role in achieving and maintaining a variety of suitable fish and wildlife habitat.

Certain kinds of wildlife live *only* on—or in association with—land that is used for growing cultivated crops or for producing livestock or timber. Many species are affected by the way farmers and ranchers go about their agricultural role. Those effects can be favorable ones, if:

- Farmers and ranchers view all of their natural resources as an interdependent whole; and
- Wildlife management is designed to fit the land and successfully integrated with its primary use.

In blending agriculture and wildlife concerns, farmers and ranchers can be aided greatly by State and Federal fish and wildlife agencies, by the Soil Conservation Service, and by the programs of local soil and water conservation districts. Fish and wildlife habitat management, as it can be accomplished through programs of land use and conservation treatment, is an important phase of district programs.

As farmers and ranchers plan and apply soil and water conservation, they often are receptive to suggestions for practices that can help wildlife and fish. Most will try to fit these practices into their conservation plan.

More than a hundred SCS biologists assist with complex fish and wildlife management problems on private lands, and train the SCS district conservationists in nearly every county in providing aid with routine wildlife habitat management.

Many conservation practices that protect soil and water resources and sustain crop yields also provide elements of wildlife habitat. Stripcropping, farm ponds, windbreaks, tree planting, range seeding, and many other practices are examples. They help make good habitat for wild creatures if they are properly designed, constructed, and used. More and more landowners are working through conservation districts to achieve a combination of practices that will fill the gap between conservation for production of food and fiber and conservation for acceptable wildlife habitat.

Landowners have installed more than 2 million farm ponds, which provide fish habitat and an element of wildlife habitat more valuable than some comparable acreages of woodland, cropland, or grassland. Within the pond itself and the surrounding area, the water and growth of natural and planted vegetation can provide food, cover, and water for a number of wildlife species.

Some farmers and ranchers decide to manage their ponds to provide an important cash crop—"fish farming." SCS aids them in basic resource appraisal, biological concerns in fish production, waste disposal, and design and layout of water management systems. Fish farming and other forms of aquaculture will be receiving a great deal more attention in future years.

The ultimate goal of farmers and ranchers is to make a living. Most wildlife habitat on farms and ranches does not

represent income to the landowner. Thus, it is difficult for fish and wildlife habitat to compete in the marketplace with food, fiber, and wood products.

Nonetheless, landowners in 1977 performed wildlife habitat management on more than 610,000 acres of wetlands, because they recognize that their decisions do significantly affect the abundance or scarcity of habitat or because they just happen to enjoy wildlife.

Wetlands in private ownership provide valuable wintering, migrating, and breeding habitat for waterfowl, as well as habitat for many other species of fish and wildlife.

One important way in which farmers and ranchers voluntarily preserve wetlands and develop high-quality wildlife habitat is through the U.S. Department of Agriculture's Water Bank Program. Landowners in more than a dozen States where waterfowl areas are most vital preserve wetlands and take other nearby acres out of farming in return for payments and technical help in improving the wetlands and adjacent areas.

The agencies involved are working hard to cut the red tape, to encourage more landowners to participate, and to stress added benefits such as habitat for other species of fish and wildlife, flood prevention, ground water recharge, and water pollution control.

Another way in which many farmers and ranchers are involved is in the more than 4,000 recreation or fish and wildlife developments that are active at any one time in multicounty Resource Conservation and Development (RC&D) areas. For example, in five counties in northeastern Pennsylvania, local RC&D sponsors are working with SCS and the Pennsylvania Game Commission to enhance existing low quality wetlands and to create more wetlands for waterfowl populations along the Susquehanna flyway.

From 30,000 to 100,000 puddle ducks, 26,000 to 75,000 diving ducks, and 75,000 to 150,000 geese cross that part of Pennsylvania during their fall migration. Yet less than 1 percent stop or remain in Pennsylvania for any length of time.

Through the RC&D effort, 16 waterfowl impoundments, 18 acres of food plots, and 8,000 feet of maintenance access road are being installed on six State game lands. The work should be completed in 1981.

Similar recreation or fish and wildlife developments may be a part of small watershed projects, too, either as an added purpose of the projects beyond flood prevention or as a means of compensating for habitat that may be adversely affected by structural measures in the project. The results have been encouraging for farmers and ranchers, their communities, and the agencies that assist them.

Thanks to closer cooperation with the Fish and Wildlife Service in a set of guidelines for stream channel modification, watershed projects are doing a better job of moving water safely.

We will continue the job of working out some disagreements, correcting some interpretations, reviewing the effects of compromises already reflected in the guidelines, and weighing whether the guidelines should become binding regulations. Together we are using a standard format for helping local people and agencies resolve channel modification issues and decisions in watershed projects.

I think that when people of various agencies meet together in specific projects and blend their concerns and ideas with those of the people on the land, it is a very positive step toward better projects, better teamwork for the future, and a fuller response to President Carter's directives on channel modification and other issues.

Another improvement in watershed projects is an effort to speed the accomplishment of conservation land treatment—increasing the amount applied before structural measures can be installed, and working to design future projects in which watershed aims of the local people can be met with fewer structures.

Farmers and ranchers and their communities also can do a better job in making decisions about wetlands and other resource questions related to fish and wildlife if they can get reliable information about wetland sites, characteristics, and conditions with a minimum of duplication or conflict.

SCS has appreciated the good exchange of ideas among Fish and Wildlife Service employees and our soil scientists and other specialists in the National Wetland Inventory. We are helping each other build into the inventory system more information about values, impacts, and tradeoffs with more understanding of the technical aspects of soil, vegetation, species, and other components.

We are helping each other improve the compatibility of wetland inventories with studies of prime, unique, and other important farmlands. Pressures for urban development affect wetlands and good farmland. Over the next 3 years more than a third of the counties in the United States will be anxious to have maps that show information about farmland and wetlands.

Agencies of Interior and Agriculture are working in several other ways, especially under a recent "four-way agreement," to share the load in gathering, interpreting, and delivering information to people who can use it on the land.

Farmers and ranchers and other people have their own information to "deliver" about natural resource concerns, including fish and wildlife habitat. Nearly 160,000 citizens discussed their concern at public meetings this past year under the Soil and Water Resources Conservation Act. Their ideas, and the ideas of interested organizations and agencies expressed at the meetings or in letters, will help all of us keep track of changes or trends in wetland acreage or condition—and sharpen public policies while encouraging private land-use decisions.

We all want the kind of land-use and management decisions that preserve the resource base and are responsive to the needs of the American people. We all want to help local and State governments and individual farmers and ranchers meet their needs for growth and development; protect the natural environment; assure adequate supplies of high quality food, fiber, wood, and water; and protect and aid fish and wildlife.

In their effort to make a living, and insure a place for wildlife, farmers and ranchers will continue to appreciate support from and close teamwork among all the public agencies that have ideas to share.

Mr. Davis was administrator,
SCS, Washington, D.C.

Above, wetlands provide high quality wildlife habitat. Farmers and ranchers are preserving areas of wetlands on their property through USDA's Water Bank Program. At left, windbreaks protect cropland and provide food and cover for wildlife.

Aquaculture: The Farming Alternative

by Billy M. Teels

Aquaculture is the controlled raising of useful animals and plants in confined water environments. Its goals range from producing a protein food, to improving natural stocks through breeding, to supplying sport fish, bait, and ornamental plants and animals.

As a promising and reliable food source, aquaculture has caught the attention of scientists, policymakers, and landowners worldwide. Fish generally provide more nutrition per unit weight than red meats, along with greater amounts of calcium and other minerals, and has unsaturated, low cholesterol fat. Some advantages of aquaculture over husbandry of other animals include more efficient use of fertilizers and feeds, higher yields per area, and lower production costs.

A major advantage of aquaculture is that it complements rather than competes with agriculture for land and water use. Aquaculture broadens areas for food production because it may be developed on lands ill-suited for crops: for instance, in sloping valleys between hills; inland swamps,

Catfish Capital of the World

Catfish production is booming in Humphreys County, Miss. SCS has assisted county landowners with fish farming operations since the first was installed in 1965.

by Don Templeton

In a State that is the Nation's leading producer of farm-raised catfish, Humphreys County, Miss., is foremost. Humphreys County catfish farmers are proud of the quality of their ponds, most of which have been constructed with Soil Conservation Service technical assistance, provided through the local soil and water conservation district.

SCS assistance to Humphreys County, primarily with water management systems, consists of selecting the best pond sites and planning pond layout. This includes checking the soil texture and determining the number and size of the ponds and levees and the location of wells and drains. SCS also advises farmers on such practices as grading pond bottoms to permit drainage and facilitate row cropping, should they later decide to take the pond out of production.

Once established, a catfish pond can stand for 10 years before needing maintenance. At that time, the levees, which have eroded through wave action, will have to be repacked. Occasionally, the entire pond needs to be drained and rebuilt by scrapers or bulldozers because of the sediment that has washed down into it.

Maintaining the required oxygen level in pond water is one of the biggest problems. The primary source of oxygen in ponds is from the algae through the process of photosynthesis. This process requires sunlight. If there are three or four cloudy days this process ceases, causing fish to suffocate. Oxygen is also absorbed into the water by surface turbulence caused by wind. So cloudy, still weather can spell trouble.

Resourceful catfish farmers have devised methods to solve these problems. One technique is to pump and recycle pond water using an aerator. The aerator shoots the water up and back into the pond, catching the oxygen in the air in the process. Another method is to take an axle from a car or truck and attach small paddle wheels on each side where the tires were. Then the axle can be attached to a tractor so that the paddle wheels beat the water simulating

marshes, and other poorly drained wet lowlands; and coastal zones.

A second advantage is that aquaculture provides another use for the approximately 2.7 million farm ponds currently existing in the United States. The farm ponds are now used for holding the water table near the ground surface, irrigation, and flood and erosion control, as well as for stocking fish.

The field of aquaculture is complex. Selection of suitable pond sites depends upon water quantity and quality, land features and availability, soil quality, climate, and access to supplies and markets. The potential for disrupting the ecology and damaging the environment needs to be considered. The pros and cons of aquaculture development should be weighed on a case-by-case basis.

Under the guidance of trained personnel, aquaculture facilities can be designed for maximum productivity while insuring conservation of the environment. The Soil Conservation Service provides this expertise by informing landowners of the potential of their resources for aquaculture, and giving technical assistance in facility design and layout, water management systems, and other aspects of fish culture.

Through the combined efforts of landowners and Federal, State, and local agencies, sound resource decisions and the success of aquaculture are assured.

Dr. Teels is staff biologist, Ecological Sciences and Technology Division, SCS, Washington, D.C.

Far left, at an irrigation well that provides water for his four catfish ponds, A. B. Evans (left) looks over his fish farm operation with SCS District Conservationist Don Templeton. Near left, aerators that shoot water up into the air and back into the fish ponds help farmers insure the proper amount of oxygen is available to the fish at all times.

wave action which adds oxygen to the water. A third method is to pump fresh water into the pond.

A minor problem related to oxygenation is the threat of aquatic weed growth. The pond must be kept at a minimum depth of 4 feet, so that sunlight won't reach the bottom. When the water becomes too shallow, weeds start growing. Like algae, weeds may also die and decay and deplete oxygen, making harvesting more difficult.

It generally takes about 1½ years to grow catfish to market size. After the fish are spawned in June, they are placed in fingerling ponds where they grow to a length of 6 to 8 inches during the summer and fall. The fish are then transferred to production ponds where they are generally stocked 2,000 to 3,000 per acre. They remain in these ponds until they weigh 1 to 1½ pounds, which usually takes 8 to 10 months. The catfish are then sold to local processing plants or to live haulers who take them to sport fishing lakes located primarily in the Midwest.

Catfish production started in Humphreys County in 1965 with two farmers and less than 100 acres in ponds. Since 1965, business has boomed. Sixty-six catfish farms, producing over 22 million pounds of catfish annually, now contribute more than $22 million to the county's economy.

A. B. Evans of Isola was one of the first catfish farmers in Humphreys County. Evans talks about his experience in farming:

"I didn't have enough land to grow crops profitably. In 1969, a neighbor, who had started fish farming on a small scale, suggested that I try it and brought us his records to review. My wife and I were convinced that there was more money in fish farming than in row crop farming for a farm our size.

"We asked the local SCS office for help. SCS District Conservationist Don Templeton had worked with every farmer in our county who had built catfish ponds and he knew the problems we might run into. We asked him to look over an 80-acre tract of land and to recommend a proper pond layout and estimate the cost. We told him how much we could spend on the project.

"Templeton determined the best location for the well and designed four ponds. Some farmers had tried smaller ponds, but they required more money for the levees and drain pipes. Templeton's guidance in the best use of our land resulted in considerable savings in construction costs.

"Catfish farming was a new venture for farmers. Many things had to be learned by trial and error, and errors in pond construction are costly. Maintenance of levees is expensive and, based on Templeton's advice, we are now building wider levees with greater slope.

"Without SCS's help and advice, Humphreys County would not have become the 'Catfish Capital of the World.' "

Mr. Templeton is district conservationist, SCS, Belzoni, Miss.

Crawfish Farming in Cajun Country

by Steve Foland

Whether fried, boiled, or smothered (étouffé), the recipes are not so important to the people of the Acadian Coast in south-central Louisiana as the crawfish in the recipes are. As one of these friendly people of French descent says, "I don't suppose there is anything that won't eat crawfish, but their worst predator is a hungry Cajun."

For political reasons, the ancestors of these Cajuns, or French-speaking Louisianians, were deported by the British from Acadia, Canada, in 1755. The Acadians, or Cajuns, of today tell a story about the Atlantic lobster following their hapless forebears from the area now known as Nova Scotia to a new home in the sultry South. In the new clime, according to the myth, the crustaceans became much smaller, fresh-water creatures; but they still had the ability to please the discriminating palates of the Cajuns.

Perhaps because of their heritage, the people of Louisiana now produce and consume about 90 percent of the U.S. crawfish crop. This figure is slowly changing, though, through the efforts of farmers like Fred Kyle in St. Mary Parish, La. Kyle, a one-time catfish farmer, has turned 210 acres of old rice fields into an efficient crawfish farm, and he is looking to the Northeast as the market for his crop.

Kyle's operation typifies a business-like approach to the only large-scale crustacean aquaculture in the United States. Instead of laboriously wading beside the wooden canoelike *pirogues* traditionally used to harvest the trapped crawfish, Kyle and his helpers speed from trap to trap in air boats. By suspending the chicken wire traps from plastic floats instead of securing them to stakes that could be knocked over by the somewhat erratic boats, Kyle is able to use the airplane-propeller-driven craft and cut his harvest time by about 30 to 40 percent.

Kyle also built a processing plant that has developed and patented machinery that can process five times more crawfish an hour than old-fashioned hand methods. Mainly through

Far left, Fred Kyle (left) steers an airboat through alligator weed toward a crawfish trap. Brad Broussard, SCS district conservationist (center), and Jay Hunter, a biologist at Southern University, count the crawfish harvested to aid Kyle in his pond management. Near left, Kyle (left) and a helper sort crawfish.

the efforts of an enthusiastic young marketing representative, Steve Afeman, most of the frozen crawfish tails processed by the plant now go to such outlets as exclusive New York City hotels that are looking for exotic entrees for their menus. Perhaps as crawfish farming spreads and becomes more efficient, the crawfish will become an available item in the frozen food sections of most U.S. grocery stores.

The conversion of the rice fields to crawfish ponds was not problem free. The fields were along the edge of a muggy swamp with its undesirable weeds and tidal fluctuations.

Kyle contacted biologists at Louisiana State University and at Southern University for information on the breeding and feeding habits and proper habitat for crawfish. He also asked the Soil Conservation Service for assistance in preparing the ponds.

According to District Conservationist Brad Broussard, SCS designed levees to enclose three square ponds of 10, 80, and 120 acres. The tops of the levees are about 5 feet above sea level, and the bottom of the ponds at the lowest point is below sea level.

Kyle installed a pump in the lowest corner of the ponds, and all the water used for the crawfish is pumped into and out of the ponds as needed. The two smaller ponds are drained by gravity into the largest pond, and the pump sends the water from the large pond into the cypress and hardwood swamp beyond the levee.

In addition to eliminating the tidal fluctuations, the levees and pump allow Kyle to cultivate the bottoms of the ponds when they are dry to control undesirable weeds in the ponds. Water hyacinths and other aquatic plants that plague the ponds begin decomposing when the ponds are flooded to production level, and the decomposition robs the water of oxygen essential for the crawfish.

SCS, in addition to supplying Kyle with Japanese millet seed from an SCS plant materials center, recommended practices that would encourage the growth of alligator weed. The millet and alligator weed provide food, cover, and valuable shade for the crawfish.

The swamp around the ponds still supports abundant fish and wildlife. Bear, bobcats, foxes, and alligators live in and roam the steamy wetland beyond the perimeter levee that Kyle calls "the last dry land between here and Cuba." Kyle does all he can to maintain and enhance the suitable wildlife habitat—even to instructing workers on the farm to release snakes accidentally caught in the crawfish traps.

At SCS's recommendation, Kyle installed wood duck boxes designed to simulate the diminishing upright hollow cypress and hardwood trees used by the ducks for nesting. The ponds, as well as the swamp, are now shared by the wood ducks, the alligators, and, of course, the crawfish. An enthusiastic conservationist, Kyle doesn't mind if some of his profits are "eaten up."

According to Jay Huner, biologist at Southern University, commercial crawfish ponds in Louisiana alone now cover about 50,000 acres, and ponds are being developed in such diverse places as Hawaii, South Carolina, and Spain. If all the commercial operations are based on Fred Kyle's type of operation and if all crawfish farmers share his concern for wildlife, various species will thrive as increased numbers of delectable crawfish are consumed by more and more people in the United States.

Mr. Foland is chief, conservation news and reports branch, SCS, Washington, D.C.

Louisiana Crawfish on the East Coast

by Albert H. Cole
and James W. Preacher

They look like Maine lobsters, taste like a cross between lobster and shrimp, and are a gourmet dish in Louisiana. The culinary treat is crawfish. Once confined to Bayou country, these crawfish are now being raised commercially on the South Carolina coast by landowners like Ed Fountain.

Fountain had been trapping and selling small native Carolina crawfish as fish bait for several years. Two years ago, he became interested in raising Louisiana crawfish as a gourmet food item after watching a Soil Conservation Service TV news program. The program showed SCS assisting a local cooperator who was establishing a crawfish pond. The development of the pond was part of the field trials started by SCS in 1976 to see if Louisiana crawfish could be farmed commercially in South Carolina lowcountry.

Fountain contacted SCS for help. SCS personnel surveyed Fountain's prospective pond to determine if it would support crawfish on a year-round basis. They checked for such items as a dependable source of pollution-free water to flood the pond, water hardness required by the crawfish for proper shell development and growth, and a heavy clay-type soil which is capable of holding open burrows during reproduction cycles and is suitable for growing vegetation which feeds the crawfish. Two other items considered were distance to the market and available labor force for harvesting the crawfish.

The inspection of the pond proved favorable, so Fountain decided to set up his own commercial operation. Stanford Gauthier, SCS district conservationist in St. Martin Parish, La., arranged with a local processing plant to supply Fountain and other farmers with Red Swamp and White River crawfish.

In May 1977, 75 pounds of Louisiana crawfish were flown in and stocked in Fountain's 1-acre pond. Two weeks after stocking, water in the pond was slowly lowered. This allowed the previously mated female crawfish to burrow underground for the summer. In addition to inducing burrowing for reproduction, the draining of the pond also eliminated any predatory fish and permitted the growth of aquatic food plants, such as alligator weed and water primrose. To supplement the crawfish's diet, Fountain planted smartweed and millet while the pond was drained.

In September the female crawfish laid their eggs. Two weeks after the eggs hatched, the pond was flooded again so the young crawfish could swim off and feed on the small, aquatic animal life and decaying vegetation.

Fountain says, "Everything went as expected. The females hatched their eggs while in the burrow and came up with their young when the pond was flooded again in early October."

Harvesting of the adult crawfish began in late December and continued into May. The pond proved to be very productive with over 1,000 pounds of crawfish trapped and sold during the first year of operation. By next trapping season, Fountain plans to triple the size of his operation.

It is easy to count the benefits of crawfish farming. These crustaceans reproduce in large numbers and grow rapidly—60 to 90 days—to market size. A well-managed crawfish pond is self-perpetuating, and assures the best use of natural resources. Based on Fountain's and others' successes, in another 5 to 7 years crawfish farming should be a lucrative industry. South Carolinians, prepare to feast!

Mr. Cole was district conservationist, SCS, Florence, S.C., and is now retired.
Mr. Preacher was formerly a biologist, SCS, Columbia, S.C.

Crane Habitat Recovery

by Clark Scoggin

The coastal lowlands of Jackson County, Miss., are generally flat with waterlogged, highly acid soils that were suited in the past only for substandard grazing and timber production.

The U.S. Department of the Interior's Fish and Wildlife Service (F&WS) has purchased a large tract of this land and established the Mississippi Sandhill Crane National Wildlife Refuge to provide nesting and feeding areas for approximately 40 remaining Mississippi sandhill cranes.

The Mississippi sandhill crane, an endangered subspecies, is found only in Jackson County. According to Jacob M. Valentine, Jr., biologist with F&WS in Lafayette, La., this is the last stronghold of a population which once may have stretched from Louisiana to Florida.

This large, long-legged gray bird has a bare red crown and long gray feathers that curl down over the tail. About the size of the great blue heron, this crane is heavier bodied, has a thinner bill—about as long as its head—and flies with its neck extended. Although the bird is nonmigratory, the loud unison call of the male and female can be heard during flight. The Mississippi sandhill crane is similar in many ways to the Florida sandhill crane, but features several minor taxonomic differences in measurement and color from other sandhill cranes.

The crane breeding grounds are found in the southern half of the county where two basic communities important to the ecology of the cranes exist: the savannas and the swamps. The greatest are the savannas, commonly called wet prairies. These are grasslands with scattered longleaf pine, cypress, and slash pine.

Until 1958, the area was open range and livestock roamed freely over much of the land. The abolishment of free range ended the need for burning the range which maintained the wet prairies. These areas were then planted to slash pine and managed for intensive silviculture. Along with tree planting since the mid-1950's, shallow furrows were plowed through the open savannas. These furrows were connected to larger drainage ditches which emptied into bayous. The increased drainage which resulted changed the ecology of the wetland habitat, reducing crane nesting and feeding areas.

The original nesting and feeding areas are to be restored by the Young Adult Conservation Corps working with the F&WS on the refuge. Conservation practices to be implemented include low-level dams to control water levels in the savannas and swamps, clearing of brush and trees from the savannas to allow them to return to their original condition, and periodic controlled burning of the feeding and nesting grounds to prevent brush encroachment.

The Soil Conservation Service helped locate sites for the dams and provided information about the soils and flooding frequency, as documented in the Jackson County Soil Survey. The soil survey was prepared by SCS and the Mississippi Agricultural and Forestry Experiment Station as part of technical assistance provided to the Jackson County Soil and Water Conservation District.

With the exception of woodpeckers and perching birds, there is a scarcity of wildlife on the refuge. Quail and dove are seen occasionally along refuge roads and open areas. As the proposed habitat management practices are implemented with small areas being cleared, the increase in the edge habitat will benefit many species of wildlife in addition to the Mississippi sandhill crane, which has been called "the world's rarest crane."

Nineteen of these beautiful birds now live in captivity at the Patuxent Wildlife Research Center in Laurel, Md. Biologists hope to secure 10 breeding pairs in captivity. Their young will be used to increase the crane population in Jackson County.

Mr. Scoggin is district conservationist, SCS, Pascagoula, Miss.

News Briefs

Riparian Symposium Proceedings

On December 11–13, 1978, 24 government agencies and private organizations cosponsored the first national riparian symposium. The symposium, titled "Strategies for Protection and Management of Floodplain Wetlands and Other Riparian Ecosystems," focused on the multiple values of riparian ecosystems and the need for comprehensive interagency planning and management to protect and enhance these ecologically sensitive systems.

The proceedings consist of 55 papers which discuss findings of ongoing programs; new insights into ways of developing comprehensive interagency programs to address riparian ecosystem problems; and characteristics, values, and management of flood plain wetlands and other riparian environments. Included under the management section are position papers by the U.S. Environmental Protection Agency, USDA's Forest Service and Soil Conservation Service, and USDI's Fish & Wildlife Service and Bureau of Land Management.

A limited supply of the proceedings is available from USDA's Forest Service, Office of Information, P.O. Box 2417, Washington, D.C. 20013. Request General Technical Report WO–12.

USDA Pumps Irrigation Wells by Wind

A prime energy user in production agriculture, irrigation accounts for 13 percent of all energy used on farms. In the Southern Great Plains, irrigation pumping consumes about 50 percent of the energy used on irrigated farms. Irrigation farmers are worried about the cost of energy and the uncertainty of energy supplies.

In response to these concerns, the USDA Southwestern Great Plains Research Center in Bushland, Tex., has successfully carried out a wind energy project for irrigation pumping. In a paper presented before the American Society of Agricultural Engineers (ASAE), Agricultural Engineers R. N. Clark and A. D. Schneider described the project. Its objectives were to assemble a complete wind-power pumping system for irrigation wells to adapt or modify existing pumping equipment so that it could be effectively powered by a wind turbine, and to make economic analyses of wind pumping systems. Results were better than expected: 65 percent of the energy used to pump water was supplied by the wind, for a 65 percent savings in electrical cost.

The USDA engineers coupled a large vertical-axis wind turbine to an existing deep well irrigation pump system. The pumping system used both the wind turbine and an electrical motor to power the irrigation pump in a "wind-assist concept," using an overrunning clutch to synchronize the two power sources. The clutch, combination gear drive, and connecting shafting were all purchased as "off-the-shelf" items commonly available in irrigated areas, and the pump was adapted without modification. Promising lower initial cost and reduced maintenance, the convenience of readily available components is a big plus. In addition, new machines are being developed that should be economically priced, reliable, and that will provide farmers with a good power unit for their pumps.

At Bushland, the wind turbines are expected to produce some power from the wind at least 70 percent of the year, and about half of the required power for irrigation during 18 percent of the year. The USDA engineers are optimistic that the wind-powered pumps could soon be providing an alternate source of energy for irrigated agriculture throughout the country. For further information on this project, contact Roger Castenson, ASAE, (616) 429–0300, and request Item WM–78–2549.

Study Underway of Farmland Conversion to Nonagricultural Uses

The U.S. Department of Agriculture (USDA) and the President's Council on Environmental Quality (CEQ) will conduct an interagency study to investigate the extent and causes of conversion of agricultural land to nonagricultural uses.

The study also will assess efforts of State and local governments to retain agricultural lands and will identify ways in which these efforts could be made more effective.

The study is to be completed by January 1, 1981, and submitted to the President.

Secretary of Agriculture Bob Bergland and former CEQ Chairman Charles Warren signed a memorandum of agreement to carry out the study and will cochair the study group. Bob Gray, formerly administrative assistant to Rep. James Jeffords (R–Vt.), has been named study director and will head a full-time staff. Members of a coordinating group will be named from other Federal agencies whose actions affect agricultural land.

Agricultural lands have been disappearing at the rate of nearly 3 million acres per year, according to USDA. Many of these acres are converted to urban uses or used for highways, airports, shopping centers, and other nonfarm purposes. Some acres are covered by water.

"If our best farmlands are used for other purposes," said Bergland, "we may face decreasing production, increased energy needs, and higher prices for commodities."

Bergland said USDA's revised land-use policy, issued October 1978, shows its commitment to assure the maintenance of agricultural lands. Well-managed farm and forest lands often provide important environmental benefits, including wildlife habitat, open space and recreational opportunities, as well as a stable economic base, he said.

A recent report prepared for CEQ by the National Conference of State Legislatures showed that 48 States and many local governments have adopted agricultural land retention programs of one form or another.

"We need to evaluate the effectiveness of the various agricultural land protection efforts from a national perspective," Warren said, "and make this evaluation available to State and local government officials and others concerned about this problem."

Warren also indicated that the study would evaluate the role of Federal agencies in agricultural land conversion and recommend policy changes if appropriate.

Meetings:

October	
3–7	American Horticultural Society, Portland, Oreg.
7–12	Water Pollution Control Federation, Houston, Tex.
10–12	Hardwood Plywood Manufacturers Association, Los Angeles, Calif.
12–18	American Association of State Highway and Transportation Officials, Hartford, Conn.
13–17	American Planning Association, Baltimore, Md.
14–17	Society of American Foresters, Boston, Mass.
16–18	Agricultural Research Institute, Washington, D.C.
20–25	National Environmental Sanitation & Maintenance Educational Conference/ Exposition, Clearwater Beach, Fla.
22–26	American Society of Civil Engineers, Atlanta, Ga.
25–28	National Association of Biology Teachers, Inc., New Orleans, La.
28–31	American Forestry Association, Charleston, S.C.
28–Nov. 1	Congress for Recreation and Parks, New Orleans, La.
29–30	Benefiting From Environmental Monitoring Conference, Arlington, Va.
31–Nov. 4	The American Society of Landscape Architects, New Orleans, La.
November	
4–7	The Irrigation Association, Marco Island, Fla.
5–8	The Geological Society of America, San Diego, Calif.
5–9	National Adult Education Association, Boston, Mass.
7–9	Future Farmers of America, Kansas City, Mo.
11–14	National Agricultural Bankers, Salt Lake City, Utah
11–14	National Association of State Universities and Land Grant Colleges, Washington, D.C.
11–14	National Forest Products Association, Palm Springs, Calif.
12–20	The National Grange, Lancaster, Pa.
15–16	National Conference on Soil Conservation Policies, Washington, D.C.
25–29	American Institute of Chemical Engineers, San Francisco, Calif.
December	
2–5	American Society of Farm Managers and Rural Appraisers, Inc., Chicago, Ill.
3–7	American Geophysical Union, San Francisco, Calif.
3–7	Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Lexington, Ky.
4–7	Western Forestry Conference, Spokane, Wash.
6	Keep America Beautiful, Inc., New York, N.Y.

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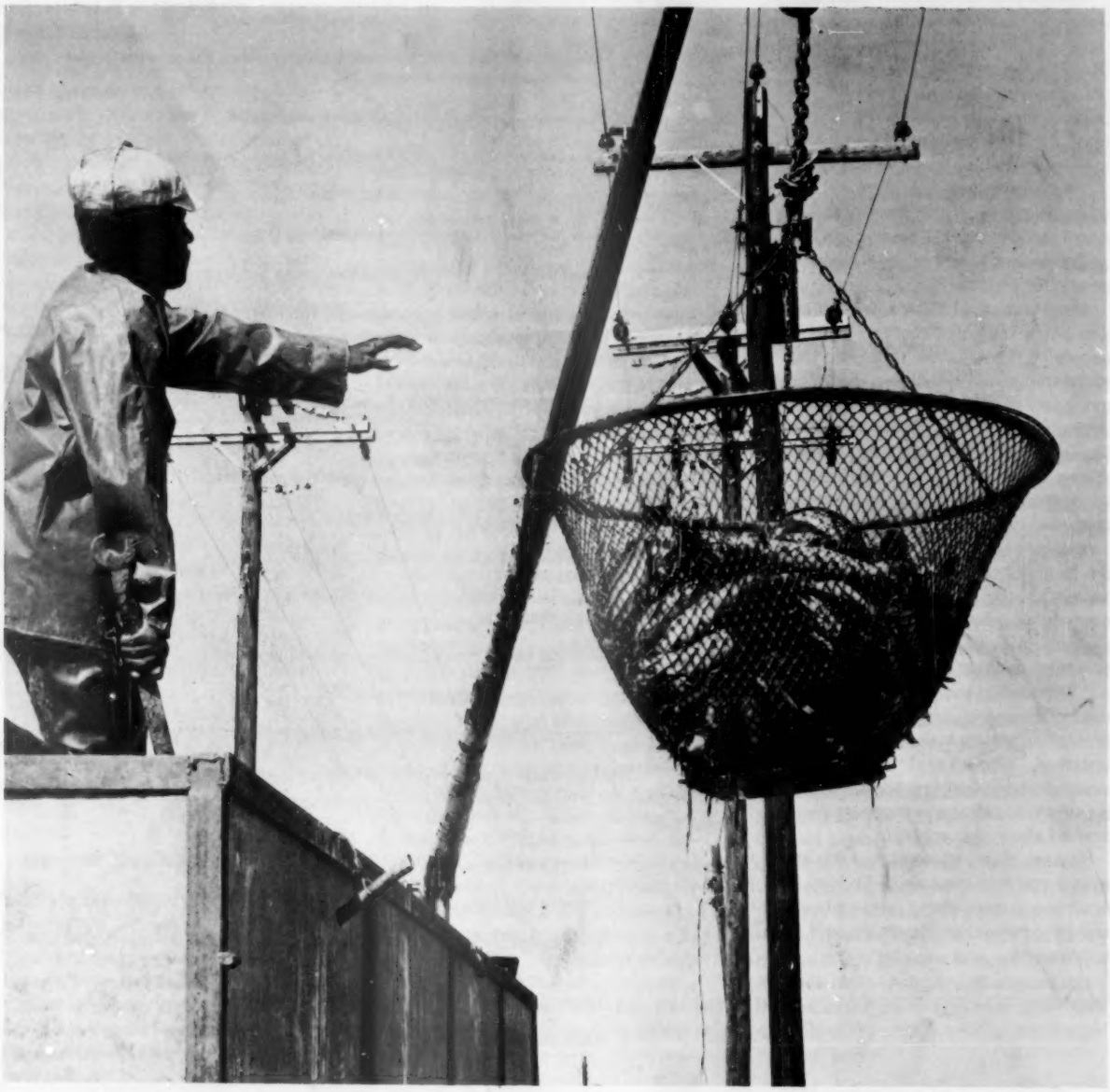
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